Height-adjustable working table

The invention relates to a height-adjustable working table with two guide rails for receiving a worktop, which is adjustable in its working height by means of a drive motor with cable drums and pull cables.

Working tables, which also include desks or workbenches, are known, which consist of a metal frame, which supports what is known as the worktop. In this connection, the frame consists to begin with of a lower frame, which consists of at least two outer tubes which are connected at a distance via a strut and can have a different cross-sectional shape and cross-sectional size. Inner tubes, which are interconnected either exclusively via the worktop or, if necessary, additionally via a strut as well, are then guided displaceably in the outer tubes. In this arrangement, in each case one outer tube and one inner tube form a support leg of the working table. In order for it then to be possible to vary, or increase, the height of the worktop, a cable is in each case connected in the upper region of the lower frame, preferably in the upper region of the outer tube, which cable is guided to the lower end of the inner tube, deflected there, guided upward again, subsequently extends, in the upper region of the outer tube, into the lower frame and is there taken up by a tension unit, which may be designed as, for example, a cable drum. In this arrangement, all the cables of the support legs are connected to the tension unit. By appropriate movement of the tension unit, the inner tubes are then gradually, but within predetermined limits, pushed out of the outer tubes, so that the worktop is raised. With an opposite movement of the tension unit, the pull cables are slackened again, and the inner tubes move back into the outer tubes owing to the weight, in particular of the

worktop. In this connection, the tension unit can be moved either by hand or via a special drive.

Such working tables are relatively complicated and expensive to manufacture. This is connected in particular with the fact that the outer and inner tubes forming the support legs are special profiles and have to be guided very accurately in one another via special sliding pieces. Owing to the design of the upper and lower frame, the working table is always ready-assembled before it is delivered, which involves high transport costs. Such a working table is furthermore relatively heavy, which is disadvantageous in terms of setting it up.

The object of the invention is to produce a working table with a height-adjustable worktop, which has a relatively low weight and is very inexpensive. The working table is moreover to be designed in such a way that it can easily be dismantled into its component parts, can be packed in a small space and can be assembled without difficulty by a layperson.

According to the invention, a working table according to claim 1 is proposed in order to achieve this object.

A working table of such design has relatively low weight with great stability and can be manufactured inexpensively. Standard tubes can be used for the guide rails, so that no special fabrication is required. Dismantled into component parts, the working table can be packed in a box with a small space requirement, be stored at low cost and thus also be transported in a space-saving way. Its design makes it possible for any layperson to assemble the working table according to the invention without special technical ability. The downward movement of the worktop takes place by virtue of its weight, so that the risk of pinching for the user is considerably reduced. The cable guide is designed in such a way that the cable never falls out

of its track. The worktop can be suspended on more than two cables, which are each driven. All the drive cables are guided on a drum. The suspension point is located above the highest table position. Preferably, the motor switches itself off automatically when at least one cable is relieved, and/or a reversal of the motor takes place by means of electronic control in order to avoid tilting of the worktop or injury to the user. Various table heights can be stored. The worktop can be of inclinable or completely fold-away design.

Further features of a working table according to the invention are disclosed in claims 2 to 9.

The invention is explained below with reference to **drawings 1 - 14**. These explanations are only examples and do not limit the general inventive idea.

Figure 1 shows an embodiment of the working table according to the invention.

Figure 2 shows an embodiment of the drive of the worktop.

Figure 3a shows an embodiment of the mounting arrangement of the pull cable.

Figure 3b shows an embodiment of the mounting arrangement of the worktop on the guide rail.

Figure 4 shows the arrangement of the motor on the tabletop.

Figures 5 - 14 show further embodiments of the working table according to the invention.

Figure 15 shows a further embodiment of the working table according to the invention.

Figure 1 shows a working table 1 according to the invention in a lateral elevation in section, the section running parallel to the narrow side of a worktop 2. The working table 1 consists of two vertically extending guide rails 3, which, in the illustrative embodiment shown, are made as support legs, are arranged at the rear side of the worktop 2 and are each made from a rectangular tube and advantageously have a square cross section. Other cross-sectional shapes can of course also be selected. In this connection, it is expedient as far as possible to use such cross-sectional shapes as are available on the market as standard tubes and do not make special fabrication necessary. The outer cross-sectional dimension of the support legs 3 is roughly 40 to 50 mm. In the lower region of each support leg 3, two struts 4, 5 running at an angle to the support leg 3 are connected, for example by welding, which likewise consist of a commercially available tube, which run at an angle of roughly 90° to one another and via which the support leg 3 is supported on the floor. The support leg 3 is consequently designed in one piece with the two struts 4, 5.

The two support legs 3 designed in one piece with the struts 4, 5 in this way are interconnected firmly but disconnectably by a metal sheet 6 having an L-shaped cross section. This connection takes place by means of screws 7, as indicated in the drawing. These screws 7 are inserted into what are known as gusset plates 8, which are located in the metal sheet 6. It is also possible, however, to interconnect these parts positively, for example by "hooking-in". This disconnectable connection makes it possible to dismantle the working table 1 and then to pack the

support legs 3 with the struts 4, 5 in a very small space. During actual assembly, therefore, the two support legs 3 are first erected and interconnected via the metal sheet 6. This results in a stable, supporting unit. The metal sheet 6 having an L-shaped cross section can be used as what is known as a cable duct.

The working table 1 also has two crosspieces 9, which are folded in a U-shape from sheet metal with a wall thickness of 2.00 to 4.00 mm and are downwardly open. At their rear ends, the web of these crosspieces 9 is notched, so that in each case a crosspiece 9 can be pushed on over a support leg 3 from above. The two crosspieces 9 are firmly interconnected by a U-shaped sheet 10 with a wall thickness of 1.50 to 3.00 mm. This connection can in this case be made in the factory and be of disconnectable or non-disconnectable design. For packing of the working table 1, however, this connection does not have to be undone, as the area of this unit is not greater than the overall area of the support legs 3. In order for it then to be possible to move and thus raise and lower the two crosspieces 9 on the support legs 3, each crosspiece 9 has an upper, rear roller 11 and a lower, front roller 12, which rollers are, for example, formed by a ball bearing and held rotatably between the legs of a crosspiece 9 and bear against a support leg 3. In addition, a sliding piece likewise bearing against the vertical support leg 3 is provided on each lateral leg of the crosspieces 9, so that good, secure guidance of the crosspieces 9 on the support legs 3 is ensured.

The U-shaped sheet 10 is inserted, open upwardly, between the two crosspieces 9 and accommodates a drive motor known per se with a shaft and with at least one cable drum with two pull cables 13 guided via deflection rollers. The arrangement of two cable drums is also possible. These parts are known per se and have therefore not been included in the drawing.

As soon as the assembly described above has been carried out, the free ends of the pull cables are each attached at an upper end of the support legs 3, which are designed specially for this purpose. The pull cables 13 are guided in deflection rollers in such a way that they can never leave the running groove of the deflection rollers, even when the cable tension is slackened. This is also the case when the working table 1 is dismantled for transport and the pull cables 13 are detached to this end. After the drive motor is switched on, the two crosspieces 9 are then simultaneously and evenly pulled continuously upward by the motor or are let down by virtue of their own weight and the weight of the worktop 2. The worktop 2, which is fastened on the two crosspieces 9 by means of screws, for example, can thus be raised or lowered. The downward movement of the crosspieces 9 and thus the lowering of the worktop 2 takes place exclusively by virtue of the dead weight of the worktop 2, crosspieces 9 and U-shaped sheet 10 with the drive parts located therein. The drive exerts no forces of any kind on the crosspieces 9 for this purpose. When the tension of the pull cables is slackened, the drive motor is switched off immediately via a special switch. The adjustment range of the worktop 2 is roughly 600 mm and makes a working height of the worktop 2 of between 650 and 1250 mm possible.

In modification of the illustrative embodiment explained, it is possible to arrange the vertical tubes of the support legs 3 at the side of the worktop 2 instead of at the rear. However, the crosspieces 9 should then as far as possible extend transversely in front of the support legs 3 in order that sufficient stability of the working table 1 is ensured. If appropriate, the support legs 3 with the struts 4, 5 can then also be designed differently.

Figure 2 shows a possible embodiment of the drive of the worktop 2, which, as described above, is mounted on the guide rails 3. The pull cable 13 is supported with its one end at the upper end of the guide rail 3. The pull cable is rolled up on and off from the cable drum 14 by means of the motor 15.

Figure 3a shows a preferred embodiment of the suspension 16 of the cable 13 at the upper end of the guide rail. The suspension 16 consists essentially of a plug 17, which is preferably received at least partly positively by the guide rail 3 and is supported on its wall. The cable is arranged in the plug 17 in such a way that it can be subjected to tensile loading (illustrated by the arrow). For assembly of the working table according to the invention, the plug 17 is pushed onto the guide rail 3, and, for disassembly, it can be removed again.

Figure 3b shows two views of a preferred embodiment of the mounting arrangement of the crosspiece 9 on the guide rail 3. In the present case, the rollers 11, 12 act on the inner cross section of the profile 3, the rollers 12 being arranged at the front and the rollers 11 at the rear. The expert will recognize that in this case the profile must have a slot 20, in which the crosspiece moves up and down. In addition, a roller 18, around which deflection of the cable 13 from the cable drum (not illustrated) to the mounting 16 (not illustrated) takes place, is provided in the crosspiece.

Figure 4 shows the mounting arrangement of the motor 15 and the cable drum 14 on the worktop 2, the worktop 2 not being illustrated. The pull cable 13 is conducted from the cable drum 14 via a roller 19 to the roller 18. It can be seen that two pull cables 13 run on one reel 14, so that the upward and downward movement on the two guide rails 3 (only one illustrated) does not

have to be synchronized. The expert will recognize that it is also possible for three or more pull cables to be guided on one cable drum.

Figures 5 - 14 show possible embodiments of the working table according to the invention. In the embodiment according to Figure 8, the working table has three guide rails 3, so that the worktop is raised or lowered at three locations. The working table according to Figure 10 has a hinge 21, so that the worktop 2 can be folded down, and hinges 25, with which the leg extensions 26 can be folded in. In the embodiment according to Figure 11, the working table is arranged in a box in order for it to be possible to raise or lower a television, for example. In Figure 12, the guide rails 3 are mounted on a wall, and, in Figure 13, the guide rails 3 are made as support legs and interconnected non-positively by the crosspiece 22. Figure 14 shows a further embodiment of the crosspiece 22, which in the present case interacts positively with the support legs 3, which are braced together with one another by the cables 23.

Figure 15 shows a further embodiment of the working table 1 according to the invention. The working table 1 consists of two vertically extending guide rails 3, which, in the illustrative embodiment shown, are made as support legs, are arranged at the rear side of the worktop 2 and are each made from a rectangular tube and advantageously have a square cross section. Other cross-sectional shapes can of course also be selected. In this connection, it is expedient as far as possible to use such cross-sectional shapes as are available on the market as standard tubes and do not make special fabrication necessary. The outer cross-sectional dimension of the support legs 3 is roughly 40 to 50 mm. In the lower region of each support leg 3, two struts 4, 5 running at an angle to the support leg 3 are connected, for example by welding, which likewise

consist of a commercially available tube, which run at an angle of roughly 90° to one another and via which the support leg 3 is supported on the floor. The support leg 3 is consequently designed in one piece with the two struts 4, 5.

The two support legs 3 designed in one piece with the struts 4, 5 in this way are interconnected firmly but disconnectably by a metal sheet (not illustrated). This disconnectable connection makes it possible to dismantle the working table 1 and then to pack the support legs 3 with the struts 4, 5 in a very small space. During actual assembly, therefore, the two support legs 3 are first erected and interconnected via the metal sheet. This results in a stable, supporting unit.

The working table 1 also has two crosspieces 9, which are folded in a U-shape from sheet metal with a wall thickness of 2.00 to 4.00 mm and are downwardly open. In order for it then to be possible to move and thus raise and lower the two crosspieces 9 on the support legs 3, each crosspiece 9 has an upper, rear roller 11 and a lower, front roller 12, which rollers are, for example, formed by a ball bearing and held rotatably between the legs of a crosspiece 9 and bear against a support leg 3. The expert will recognize that in this case the profile must have a slot, in which the crosspiece moves up and down.

As soon as the assembly described above has been carried out, the pull cable 13 is guided from the motor 15 via a deflection roller 30 and fastened to the crosspiece 9 in the region of the roller 12. After the drive motor is switched on, the two crosspieces 9 are then simultaneously and evenly pulled continuously upward by the motor or are let down by virtue of their own weight and the weight of the worktop 2. The worktop 2, which is fastened on the two crosspieces 9 by means

of screws, for example, can thus be raised or lowered. The downward movement of the crosspieces 9 and thus the lowering of the worktop 2 takes place exclusively by virtue of the dead weight of the worktop 2 and crosspieces 9. The drive exerts no forces of any kind on the crosspieces 9 for this purpose. When the tension of the pull cables is slackened, the drive motor is switched off immediately via a special switch. The adjustment range of the worktop 2 is roughly 600 mm and makes a working height of the worktop 2 of between 650 and 1250 mm possible.

Patent claims

1. A height-adjustable working table with at least two guide rails (3) for receiving a worktop (2), which is adjustable in its working height by means of a drive motor with at least one cable drum and pull cables, characterized in that each guide rail (3) is formed by a profile and the worktop (2) is mounted displaceably on the guide rails in such a way that the downward movement of the worktop takes place by virtue of its own weight.

2. The working table as claimed in claim 1, characterized in that the drive motor (15) with the cable drum (14) is arranged in the region of the worktop (2).

3. The working table as claimed in one of the preceding claims, characterized in that the guide rails (3) have means (16) with which in each case one end of the pull cables (13) can preferably be attached at the upper ends of the guide rods.

4. The working table as claimed in claim 1, characterized in that the drive motor (15) with the cable drum (14) is arranged in the region of the guide rail (3).

5. The working table as claimed in claim 4, characterized in that a deflection roller (30), around which the pull cable (13) extending between the cable drum (14) and the worktop (2) runs, is arranged in the upper region of the guide rail.

6. The working table as claimed in one of the preceding claims, characterized in that the worktop (2) has a means (11, 12) which interacts with the guide rails (3) on the inner and/or outer cross section.

7. The working table as claimed in one of the preceding claims, characterized in that the guide rail (3) is designed essentially as a rectangular tube.

8. The working table as claimed in claim 6 or 7, characterized in that the means is a front and a rear roller (11, 12).

9. The working table as claimed in claim 8, characterized in that the front roller (12) and the rear roller (11) each bear against the outer cross section of the guide rail (3), at the bottom and at the top respectively.

10. The working table as claimed in claim 8, characterized in that the front roller (12) and the rear roller (11) each bear against the inner cross section of the guide rail (3), at the top and at the bottom respectively.

11. The working table as claimed in at least one of claims 8 to 10, characterized in that the rollers (11, 12) are formed by ball bearings.